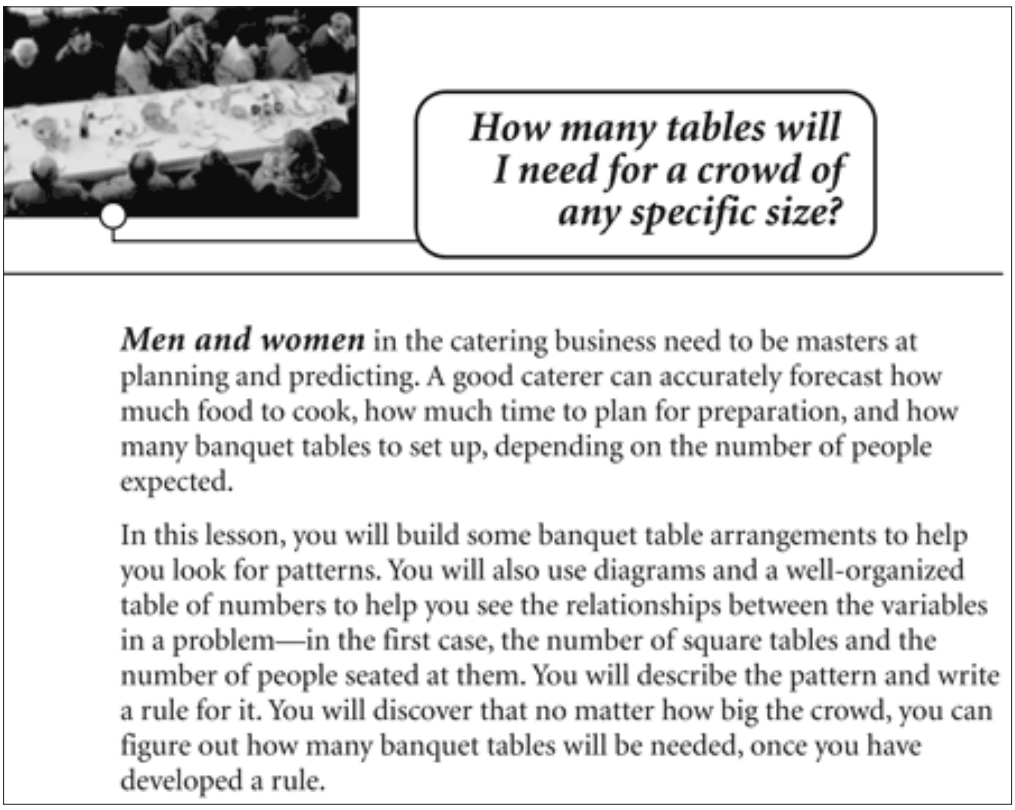
Narrative of a relationship between variables activity in an Arizona ABE/ASE classroom

Resource: EMPower's *Seeking Patterns, Building Rules*: Lesson 2—Banquet Tables



How many tables will I need for a crowd of any specific size?

Men and women in the catering business need to be masters at planning and predicting. A good caterer can accurately forecast how much food to cook, how much time to plan for preparation, and how many banquet tables to set up, depending on the number of people expected.

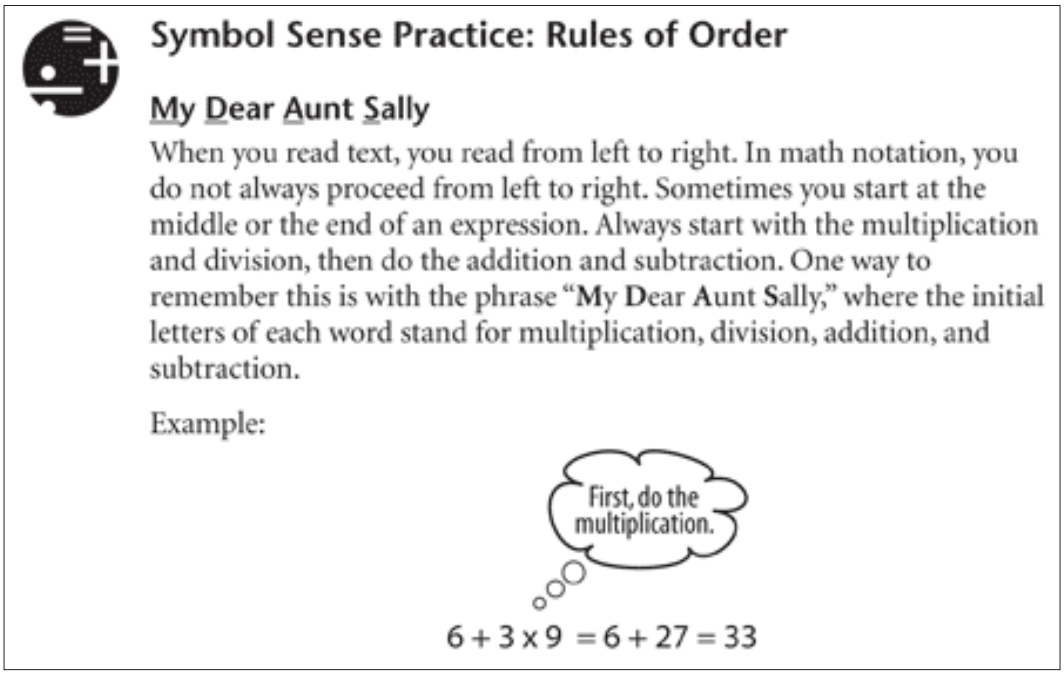
In this lesson, you will build some banquet table arrangements to help you look for patterns. You will also use diagrams and a well-organized table of numbers to help you see the relationships between the variables in a problem—in the first case, the number of square tables and the number of people seated at them. You will describe the pattern and write a rule for it. You will discover that no matter how big the crowd, you can figure out how many banquet tables will be needed, once you have developed a rule.

I began the work just after the last Institute, but found that students were totally confused. They did not know the basics of algebraic operations or equations and the EMPower lessons did not seem to cover this. So we spent several lessons going over the basic algebra unit in our Pre-GED book (McGraw Hill/Contemporary's Pre-GED) which is very well laid out and explained. We covered unknown variables and basic algebraic operations. We practiced isolating the unknown variable so as to solve the equation. I felt that this information and practice helped students better understand the work in the EMPower book.

In the time period which has transpired I have had a huge change of students. Students who have enrolled, those who have stayed for a few classes and left, and others which have remained but are relatively new to the class. It has been extremely challenging trying to follow a consistent course of study in algebra. In addition, I try to find a time when all my students will be present, but many are absent or leave early. It has been a frustrating experience. Adjustments have been necessary at times which have included allowing students to catch-up on necessary graphs for the upcoming lesson by working a few minutes before the start of the lesson, giving some individual instructions, and having other students guide the absent and/or incoming students.

What was planned and why

I wanted students to understand patterns in a specific situation. I also wanted them to use the charting and equation writing practice we had done in Chapter 1 and apply it in this situation. Additionally, I wanted them to understand the phrase: Please Excuse My Dear Aunt Sally.



Symbol Sense Practice: Rules of Order

My Dear Aunt Sally

When you read text, you read from left to right. In math notation, you do not always proceed from left to right. Sometimes you start at the middle or the end of an expression. Always start with the multiplication and division, then do the addition and subtraction. One way to remember this is with the phrase "**My Dear Aunt Sally**," where the initial letters of each word stand for multiplication, division, addition, and subtraction.

Example:

$6 + 3 \times 9 = 6 + 27 = 33$

My students range from ABE I to ASE II+. These are the skills they got from this lesson:

- ABE I algebra sub-indicators state that students create and describe a variety of patterns and formulates generalizations to make predictions.
- ABE II algebra sub-indicators state that students use variables to understand and solve simple algebraic expressions.

These skills are pre-cursors to those needed for the next levels which are:

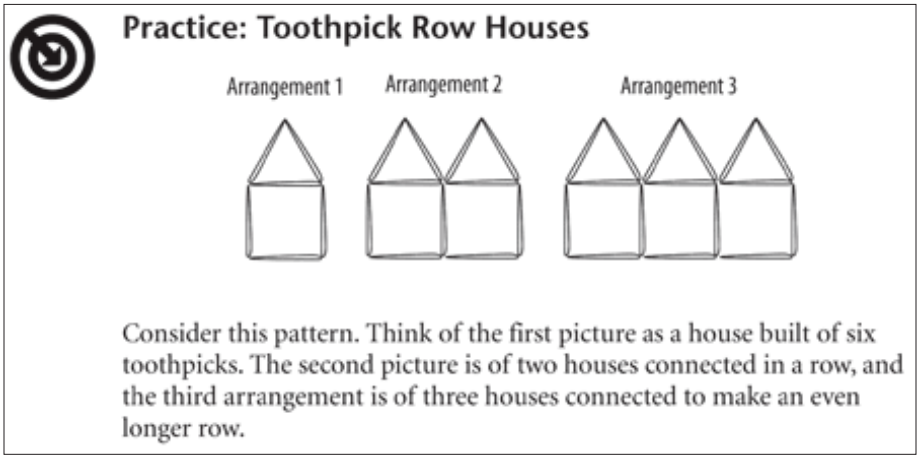
- ABE III algebra sub-indicators stating that students write and solve linear equations, inequalities and functions. They graph and interpret their results.
- Students write and solve word problems using algebraic expressions and equations.
- ASE I algebra sub-indicators stating that students set up and solve linear equations and inequalities with complex coefficients using algebraic and graphical methods. Set up and solve systems of equations and inequalities. Solve quadratic equations. Perform operations using polynomial expressions. Demonstrate a basic understanding of functions.
- ASE II algebra sub-indicators stating that students understand and compare the properties of classes of function. Interpret algebraic equations and inequalities geometrically and describe geometric relationships algebraically. Perform mathematical operations on matrices. Use the methods and operations of algebra to simplify expressions and to solve equations, inequalities, and systems of equations and inequalities.

The class begins...

The day Chapter 2 was presented, we reviewed tables and equations before beginning Chapter 2.

I had students pair off and gave each pair a stack of index cards cut in half so they could use as manipulatives. We did pages 22 and 23 problem by problem. Pages 24 and 25 were confusing because it seemed like some of the questions were alike. Students worked the first few problems, then we compared the equations: $p = 2t + 2$ with $t + t + 2 = p$ and $2(t - 2) + 2(3)$. We found that all three are the same.

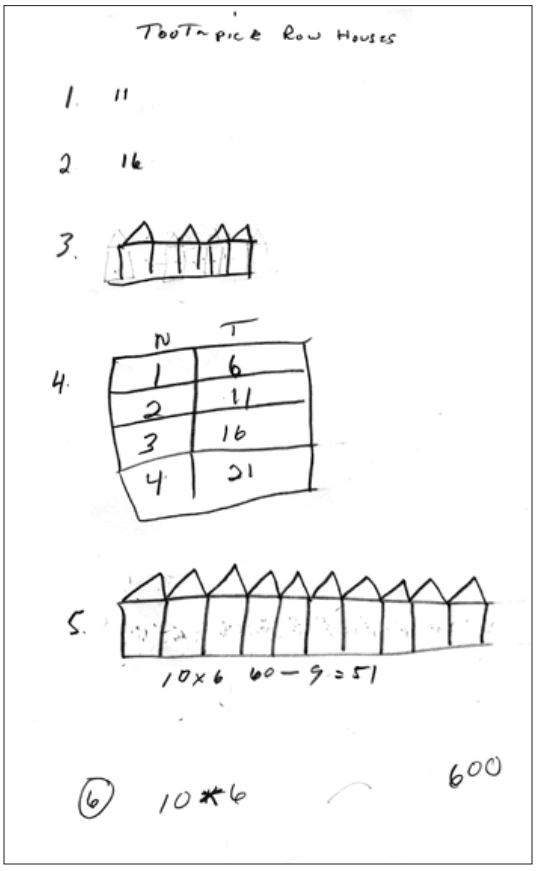
Next, students did pages 26 and 27, Toothpick Row Houses, on their own with partners without my help.



Practice: Toothpick Row Houses

Arrangement 1 Arrangement 2 Arrangement 3

Consider this pattern. Think of the first picture as a house built of six toothpicks. The second picture is of two houses connected in a row, and the third arrangement is of three houses connected to make an even longer row.



Toothpick Row Houses

1. 11

2. 16

3.

4.

N	T
1	6
2	11
3	16
4	21

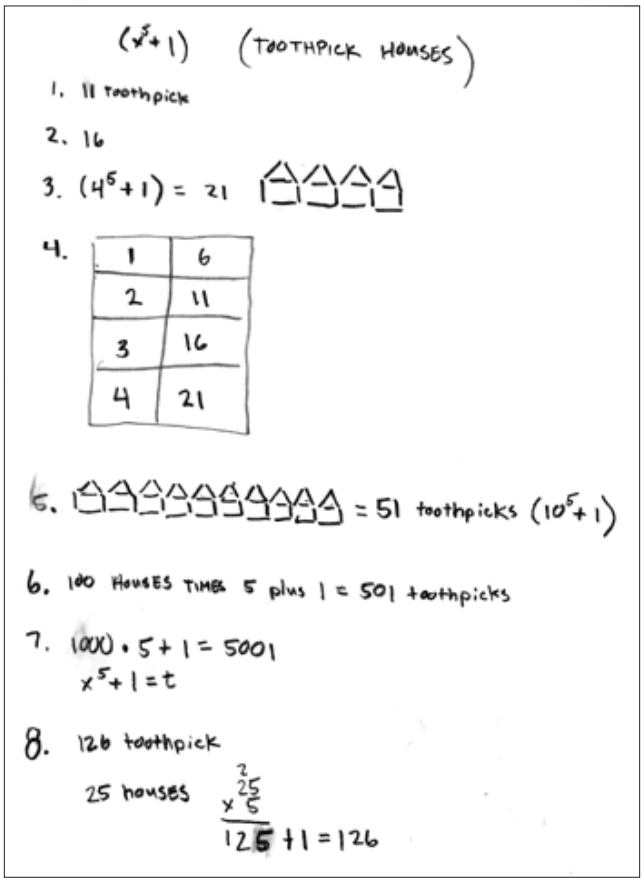
5.

10×6 60−9=51

6. 10*6 600

I have two students who are academically challenged and just don't get it a lot of the time. In doing the Pre-GED review one student just could not get that whatever you do to the equation you have to do the same thing on both sides of the equal sign. In fact, nothing seemed to make sense to him no matter how much I simplified the lesson and how many times we practiced. What I did for this lesson was to pair up these two students with my two highest achievers. Sometimes this didn't work to the student's advantage...even though this student's paper (on the left) shows mostly correct answers, he was partnered with a high-achiever. This student is good at copying down the work, but that does not mean that he understands it. This is evident in the absence of verbal expression throughout.

The following student's work shows that he understands patterns but is weak in other mathematical areas. He is confusing multiplication with exponents.



The next day we covered: Please Excuse My Dear Aunt Sally. We actually had fun doing these two pages at the end of Chapter 2. We solved the equations on white board slates. This way I could see what they were doing. By the end of the exercises, we were all experts. The hardest part was when we ended up with a negative number and then we had to add it to another number, but there was no initial addition sign, so it was implied to add. Students had a difficult time with this.

Parentheses

In mathematical notation, parentheses signal where to focus first. Evaluate each expression, paying attention to the math operations inside the parentheses first. Then perform any remaining multiplication and division before doing the addition and subtraction.

Example:

$6(12-4) = 6(8) = 48$

None of my students got all answers correct, even my top achievers; however, all students gained some understanding of charting and equations.

The Teacher's Reflection

My biggest challenges were the diverse levels of students: from ABE I to ASE II+, the incoming and outgoing students, their absences and inconsistencies of being in class, not having an algebraic foundation for all my students to start from, not having a foundation chapter in the EMPower book.

Those who were already strong because of the work we had previously done and because of their longevity in class did well. Those who had not been in class that long but had previous experience did well. Those who are cognitively challenged made the most errors or wrote the same answers as their partners, but did make some gains in understanding patterns.

Everyone participated; however, they were very quiet as much as I tried to elicit participation. It was very different from the data and statistics lesson we did previously. There was much interaction at that lesson. This one was much more labored and not as much fun for any of us. In fact, everything we've done in this book has been hard work and not very fun. Even though students were working in partners they didn't seem to interact much with one another. Maybe they were too busy thinking and trying to figure things out. This is a very challenging way of thinking. Maybe it just takes practice.